Title

Torch Lighter for Cigar

Cross Reference of Related Application

This is a divisional application of a non-provisional application, application number 10/079,990, filed February 19, 2002.

Background of the Present Invention

Field of Invention

The present invention relates to lighters, and more particularly to a torch lighter for cigar which is constructed to produce two or more strong diverging torches via a single fuel supplying source, wherein a torch stabilizing and firming technology is employed in the torch nozzle head to virtually produce a strong and stable gathering group of soaring torches, that is especially good at igniting cigars.

Description of Related Arts

A lighter is a common tool that replaces matches for igniting cigarettes and cigars. Generally, there are two types of lighter, namely the regular lighter that produces flat flame and the torch lighter that produces torch.

There are various types of regular lighter, including the disposable lighters as disclosed in the U.S. patents 5,547,370 and 5,096,414, the flat flame lighter as suggested in the U.S. patent 5,711,662, and the piezoelectric lighter as disclosed in U.S. patents 4,786,248 and 6,267,582. Such regular lighter is capable of generating a flat flame which is merely a single tongue of flame. Due to the soft and weak nature of the flat flame, most

of such flat flame lighters are good at igniting cigarettes but find difficulty when igniting a cigar.

Since the cigar has a bigger diameter and the cigar tobacco is dryer and harder, the torch lighter that can produce a stronger and hotter torch is generally used to ignite the cigars. U.S. patent 3,850,571 discloses a typical torch lighter that is structured to generate a single torch. Although the torch is stronger and hotter than the flat flame, its ignition area is relatively small and limited.

In order to increase the igniting area of the torch lighter, how to produce two or more torches simultaneously will be an effective solution. Since it is too costly and not practical to provide two or more torch nozzles and fuel valve assemblies in the limited interior space of the housing of the torch lighter, it is not available in market.

Japanese patent JP10-238773 suggests an alterative structure improved from the burner structure such as U.S. patent 1,884,764 to provide a flame nozzle having two or more holes to generate more than one tongues of flame. However, such multiple tongues of flame will immediate mix to form a bigger tongue of mix flame that may be larger in size than the flat flame. Such mix flame is still too soft and weak that fails to generate heat as hot as the torch does, especially at the tip portion of the flame, i.e. the main portion of the flat flame for ignition.

Summary of the Present Invention

A main objective of the present invention is to provide a torch lighter that is constructed to produce two or more strong diverging torches via a single fuel supplying source, wherein a torch stabilizing and firming technology is employed in the torch nozzle head to virtually produce a strong and stable gathering group of soaring torches, that is especially good at igniting cigars.

Another objective of the present invention is to provide a torch lighter that can produce a group of diverging torches for providing more heat at higher temperature that makes the ignition operation prompt and easy.

Another objective of the present invention is to provide a torch lighter that is windproof by producing two or more strong and stable soaring torches.

Another objective of the present invention is to provide a torch lighter which employs a torch stabilizing and firming arrangement to prevent the strong soaring torches from directly bursting into the air by providing a plurality of root flames which are united and mixed with a root portion of the soaring torches to form a stable environment root flame so as to hold the torches from being burst away by the escaping high-pressured fuel and thus gather to form a strong and stable group of torches.

Another objective of the present invention is to provide a torch lighter which virtually produces two or more flows of fuel to generate two or more torches by providing a diversion joint edge between adjacent roots of every two elongated nozzle ducts.

In order to accomplish the above objectives, the present invention provides a torch lighter, comprising:

a casing having a liquefied fuel storage and a fuel valve which is actuated by a fuel lever pivotally mounted in the casing for releasing fuel therefrom;

an ignition unit generating sparks directed toward an ignition chamber; and

a fuel nozzle assembly provided for vaporizing the fuel released therefrom to a high-pressured gaseous fuel to emit to the ignition chamber, wherein the vaporizer assembly comprises:

a tubular nozzle body having a root opening at one end thereof, an emitting opening at another end thereof, at least an air inlet provided adjacent to the root opening, and an elongated mixing chamber axially extended between the air inlet to the emitting opening thereof, wherein a flow of air is capable of inletting into the mixing chamber through the air inlet;

a torch nozzle, which is coaxially connected between the root end of the nozzle body and the fuel valve, having a micro nozzle pore having a diameter as small as 0.05mm to 0.12mm, wherein the fuel released from the fuel valve is vaporized into a

strong, pressurized gaseous fuel jetting into the mix chamber, wherein the jetting gaseous fuel provides a suction force to absorb the air into the mix chamber in such a manner that the mix chamber has a predetermined length and size arranged for the air and the gaseous fuel being evenly mixed to form a mixture gas at the emitting end of the nozzle body;

a combustion housing mounted at the emitting end of the nozzle body to define the ignition chamber therein; and

a torch head, which is provided at the emitting end of the nozzle body and supported within the combustion housing, having:

a root chamber having a size larger than the size of the emitting end of the nozzle body to form a gas stabilizing reservoir to ensure a collective and stable flow of the mixture gas,

two or more elongated nozzle ducts, each having an ignition end and a root end extended to a ceiling of the root chamber, wherein the root ends of the two nozzle ducts are adjacently positioned to define a diversion joint edge therebetween while the two ignition ends of the two nozzle ducts are diverged and extended in the ignition chamber to define a torch gap therebetween, wherein the mixture gas ejected from the two ignition ends is ignited in the ignition chamber to form two torches soaring away from the two ignition ends of the two nozzle ducts, and

means for forming a stable environment root flame around roots of the torches so as to hold the torches from being burst away by the escaping high-pressured mixture gas and thus gather to form a strong and stable group of torches.

Brief Description of the Drawings

Figure 1 is a perspective view of a torch lighter according to a preferred embodiment of the present invention.

Figure 2 is a cross-sectional view illustrating the fuel nozzle assembly according to the above preferred embodiment of the present invention.

Figure 3 is a cross-sectional view illustrating a first alternative mode of the fuel nozzle assembly according to the above preferred embodiment of the present invention.

Figure 4 is a cross-sectional view illustrating a second alternative mode of the fuel nozzle assembly according to the above preferred embodiment of the present invention.

Figure 5 is a perspective view illustrating a third alternative mode of the fuel nozzle assembly according to the above preferred embodiment of the present invention.

Figure 6 is a perspective view of the torch head according to the above third alternative mode of the above preferred embodiment of the present invention.

Figure 7 is a cross-sectional view of the torch head according to the above third alternative mode of the above preferred embodiment of the present invention.

Figure 8 is a perspective view illustrating a fourth alternative mode of the fuel nozzle assembly according to the above preferred embodiment of the present invention.

Figure 9 is a perspective view of the torch head according to the above fourth alternative mode of the above preferred embodiment of the present invention.

Figure 10 is a cross-sectional view of the torch head according to the above fourth alternative mode of the above preferred embodiment of the present invention.

Figure 11 is a perspective view illustrating a fifth alternative mode of the torch head according to the above preferred embodiment of the present invention.

Figure 12 is a cross-sectional view illustrating a sixth alternative mode of the torch head according to the above preferred embodiment of the present invention.

Figure 13 is a cross-sectional view illustrating a seventh alternative mode of the fuel nozzle assembly according to the above preferred embodiment of the present invention.

Detailed Description of the Preferred Embodiment

Referring to Figures 1 and 2, a torch lighter according to a preferred embodiment of the present invention is illustrated, which comprises a casing 1, an ignition unit 3 and fuel nozzle assembly 4.

The casing 1 has a liquefied fuel storage 21 and a fuel valve 22 which is actuated by a fuel lever 5 pivotally mounted in the casing 1 for releasing fuel therefrom. The ignition unit 3 is arranged to generate sparks directed toward an ignition chamber 440.

The fuel nozzle assembly 4 is provided for vaporizing the fuel released from the fuel valve 22 to a high-pressured gaseous fuel to emit to the ignition chamber 440, wherein the vaporizer assembly comprises a tubular nozzle body 40, a torch nozzle 41, a torch head 43 and a combustion housing 44.

The tubular nozzle body 40 comprises a throat conduit 422 having a root opening 401 at a bottom end thereof, an emitting opening 402 at a top end thereof and at least an air inlet 421 provided thereon adjacent to the root opening 401 of the throat conduit 422 so as to define an elongated mixing chamber 42 extended between the air inlet 421 to the emitting opening 402, wherein a flow of air is capable of inletting into the mixing chamber 42 through the air inlet 421.

The torch nozzle 41 is coaxially connected between the root opening 401 of the nozzle body 40 and the fuel valve 22 via a connecting conduit 24, wherein the torch nozzle 41 has a micro nozzle pore 410 having a diameter as small as 0.05mm to 0.12mm, preferable 0.08mm, wherein the fuel released from the fuel valve 22 is vaporized into a strong, pressurized gaseous fuel jetting into the mix chamber 42. The torch nozzle 41 further comprises a mesh filter 411 provided below the nozzle pore 410 to prevent any residual particles of the fuel from entering the nozzle body 40.

Accordingly, the jetting gaseous fuel provides a suction force to absorb the air into the mix chamber 42 in such a manner that the mix chamber 42 has a predetermined length and size arranged for the air and the gaseous fuel being evenly mixed to form a mixture gas at the emitting opening 402 of the nozzle body 40. Preferably, the throat conduit 422, i.e. the mix chamber 42 is an elongated straight hole having a diameter of

1mm to 2.5mm. Moreover, the throat conduit 422, the mix chamber 42, and the nozzle pore 410 are coaxially aligned while the air inlet 421 is a hole transversely formed on the root opening 401 of the throat conduit 422 that preferably has a diameter slightly larger than a diameter of the mix chamber 42.

It is worth to mention that, generally speaking, if the nozzle pore 410 has diameter smaller than 0.05mm, it is very easily be blocked by dusts and particles. If the nozzle pore 410 has a diameter larger than 0.12mm, the jetting power of the gaseous fuel is reduced for failing to produce strong torch. Similarly, if the diameter of the mix chamber 42 is smaller than 1mm, it fails to provide any stabilizing and collecting effects for the passing gaseous fuel. If the diameter of the mix chamber 42 is larger than 2.5mm, the jetting power of the passing gaseous fuel from nozzle pore 410 is eliminated.

By passing through the throat conduit 422, the gaseous fuel jetted from nozzle pore 410 and the inletting air from the air inlet 421 not only evenly mix to form the mixture gas but also concentrate and stabilize the flowing dynamic of the mixture gas before outputting through the emitting opening 402 of the mix chamber 42.

The combustion housing 44 is a ring shaped body having a surrounding wall defining the ignition chamber 440 therein. The emitting opening 402 of the torch nozzle 40 is extended to a bottom end of the combustion housing 44. According to the preferred embodiment, the ignition unit 3 is embodied as a piezoelectric unit having a piezoelectric tip 31 extended and secured to the surrounding wall of combustion housing 44 adapted to generate sparks towards the ignition chamber 440.

The torch head 43 is coaxially connected to the emitting opening 402 of the nozzle body 40 and supported within the combustion housing 44 in such a manner that the ignition chamber 440 is formed surrounding the torch head 43.

Preferably, a top end of the torch head 43 is lower than the top end of the combustion housing 44 and the outer diameter of the torch head 43 must be smaller than an inner diameter of the combustion housing 44, so that ignition chamber 440 is formed above and around the torch head 43.

The torch head 43 has a root chamber 45 having a size larger than the size of the emitting opening 402 of the nozzle body 40 to form a gas stabilizing reservoir to ensure a collective and stable flow of the mixture gas.

The torch head 43 further has two elongated nozzle ducts 431, each having an ignition end and a root end extended to a ceiling of the root chamber 45, wherein the root ends of the two nozzle ducts 431 are adjacently positioned to define a diversion joint edge 46 therebetween while the two ignition ends of the two nozzle ducts 431 are diverged and extended in the ignition chamber 440 to define a torch gap G therebetween.

According to the preferred embodiment, the two nozzle ducts 431 is formed in an upper solid portion of the torch head 43 by drilling two slant holes from a bottom end to a top end thereof. In other words, the two nozzle ducts 431 extended upwardly and outwardly to form a "V" shape arrangement. It is worth to mention that if the two root ends of the two nozzle ducts 431 are spaced apart more than 1.5mm, an eddy flow may occur between the two root ends of the two nozzle ducts 431 in the root chamber 45. It would reduce the flowing speed of the mixture gas before entering the nozzle ducts 431 and thus reduce the bursting power of the torches T1, T2 to be ignited at the ignition ends of the nozzle ducts 431. In other words, the diversion joint edge 46 is preferred to have a width from zero to 1.5mm, i.e. a distance between the two root ends of the two nozzle ducts 431, so as to evenly and smoothly diverge the mixture gas flowing through the root chamber 45 into the two nozzle ducts 431 without substantially reducing flowing speed.

In view of above, beams of mixture gas can be burst out through the two ignition ends of the nozzle ducts 431 but the sparks from the piezoelectric tip 31 substantially cannot ignite such ejecting beams of mixture gas. It is because the beams of mixture gas are burst in very high speed that it escapes into the air before the sparks ignite it.

Accordingly, the torch head 43 further comprises means for forming a stable environment root flame T3 around the torch head 43 and the emitting ends of the nozzle ducts 431 adapted for igniting the beams of mixture gas ejected from the nozzle ducts 431 to form two torches T1, T2 soaring away from the ignition ends of the nozzle ducts 431 and holding firm to the soaring torches T1, T2, as shown in Figure 2. The means comprises a torch stabilizing arrangement 430 adapted to prevent the strong torches T1, T2 from directly bursting into the air by providing a plurality of root flames which are

united and mixed with a root portion of the soaring torches to form the stable environment root flame T3 so as to hold the torches T1, T2 from being burst away by the escaping high-pressured fuel and thus gather to form a strong and stable group of torches with blue hot tip portions for better ignition effect.

According to the preferred embodiment, the diameter of each of the nozzle ducts is preferred to be 0.6mm to 1.3mm in order to produce strong and long torches. Moreover, the best effect will be achieved when the diversion joint edge 46 is sized as 0.8mm for producing two or more strong, powerful and firm diverging soaring torches.

According to the preferred embodiment as shown in Figure 2, the torch stabilizing arrangement 430 is embodied to have a plurality of diversion emitting openings 4311 formed around the torch head 43 and a conical ceiling surface 433 extended between the root ends of the nozzle ducts 413 and the diversion emitting openings 4311, wherein each of the diversion emitting openings 4311 is a through hole formed transversely at a top portion of the surrounding wall of the root chamber 45. The diversion emitting openings 4311 are preferred to be positioned right below the two root ends of the nozzle ducts 431 and evenly spaced apart at the same level.

Accordingly, since the diversion emitting openings 4311 are radially formed around the torch head 43, the main portion of the upwardly jetting mixture gas flown into the root chamber 45 will be ejected through the two nozzle ducts 431 and merely a relatively small portion of the mixture gas will be diverged to emit through the diversion emitting openings 4311 and fill up the ignition chamber 440. During the ignition operation of the torch lighter of the present invention, the sparks generated from the piezoelectric tip 31 would first ignite the mixture gas emitted through the diversion emitting openings 4311 and filled in the ignition chamber 440 to form a plurality of root flames which are united and mixed to form the environment root flame T3 surrounding the torch head 43 and the emitting ends of the nozzle ducts 431. Then, the presence of the environment root flame T3 would immediately ignite the mixture gas ejected from the two emitting ends of the two nozzle ducts 431 to produce the torches T1, T2. In fact, such a ring shaped environment root flame T3 is a preferred area for ignition.

After igniting the torch lighter, the environment root flame T3 not only holds firm to the strong torches T1, T2 to form the strong and stable group of torches but also provide a continuous flame source within the combustion housing 44. Practically, the

torch lighter of the present invention is a windproof lighter that even though the torches T1, T2 are blown out in a windy surrounding, the environment root flame T3 that continuously burns inside the ignition chamber 440 will immediately ignite the ejecting mixture gas from the emitting ends of the nozzle ducts 431 to produce the torches T1, T2.

As shown in Figure 3, a first alternative mode of the fuel ignition assembly 4' of the torch lighter according to the above preferred embodiment of the present invention is illustrated, wherein the fuel ignition assembly 4 is structurally identical to the above preferred embodiment except three nozzle ducts 431 are presented, wherein a vertical central nozzle duct 431' is additionally provided between the two slanted nozzle ducts 431 to produce another torch T4 from an emitting end thereof. Moreover, two diversion joint edges 46, each of which is made as thin as 1.5mm or less, are formed between the central nozzle duct 431' and the two side nozzle ducts 431. Due to the increased density of the torches, the group of torches T1, T2, T4 becomes more concentrated, stronger and hotter. Therefore, when a user is lighting a cigar, it likes to have three torch lighters generating three torches to ignite the cigar simultaneously. It is apparent that it is easier to light up the cigar promptly without the need of continuously rotating the cigar while using a conventional single torch lighter.

As shown in Figure 4, a second alternative mode of the fuel ignition assembly 4A according to the above preferred embodiment of the present invention is illustrated, wherein each of the nozzle ducts 431A is upwardly extended to have an upper portion above the torch head 43A. The diversion emitting openings 4311A are formed at the upper portions of the nozzle ducts 431A instead of around the torch head 43A, wherein in such arrangement, the emitting end 432A of each of the nozzle ducts 431A must be narrower and the rest of the nozzle duct 431A such that the ring of the environment root flame is formed around the root of the respective torch for stabilizing and holding firm to the torches produced at the emitting ends 432A of the nozzle ducts 431.

Figures 5 to 7 illustrate a third alternative mode of the fuel ignition assembly 4B according to the above preferred embodiment of the present invention, wherein the diversion emitting openings 4311B of the torch head 43B are vertical slots evenly spacedly formed around the torch head 43B that lead a few amount of mixture gas out in the axial direction of the exiting path of the mixture gas. Such arrangement may assure a better ring of environment root flame. As shown in Figure 6, the torch head 43B is structured like a gear and the the bottom portion of the diversion emitting openings

4311B are now actually a layer of space defined by the top surface of the fuel ignition assembly 4B and the bottom surface of the torch head 43B. However, the layer of space functions actually as multiple diversion emitting openings 4311B extending from the root ends of the V-oriented nozzle ducts 431A. The space substitutes the diversion emitting openings 4311B and eases machining of the parts. As seen in Figure 7, the diversion joint area 433B is about 1.5mm or less too.

Figures 8 to 10 illustrate a fourth alternative mode of the fuel ignition assembly 4C according to the above preferred embodiment of the present invention, which is modified from the above third alternative mode to have an additional central nozzle duct between the two slanted nozzle ducts as shown in Figures 5 to 7.

In a fifth alternative mode of the above preferred embodiment of the present invention as shown in Figure 11, the diversion emitting openings 4311D are not in round cross section or holes, but structured as slot form. These slot-type diversion emitting openings 4311D are provided at the bottom or base of the V-oriented nozzle ducts 431D.

Figure 12 shows a sixth alternative mode of the preferred embodiment of the present invention which provides a straight upper portion for each of the nozzle duct 431E. The nozzle ducts 431E have a V-orientation lower portion and then have an upper part of parallel tubular duct. Figure 13 shows seventh alternative mode of the preferred embodiment of the present invention, which is modified from the above sixth alternative mode that, like the second alternative mode as shown in Figure 4, the diversion emitting openings 4311F are formed at the upper portions of the nozzle ducts 431F instead of around the torch head 43F, wherein in such arrangement, the emitting end 432F of each of the nozzle ducts 431F must be narrower and the rest of the nozzle duct 431F.

There could be other further variations based on the teaching of the present application. However, they will be all within the scope of the present invention as defined in the accompanying claims.